

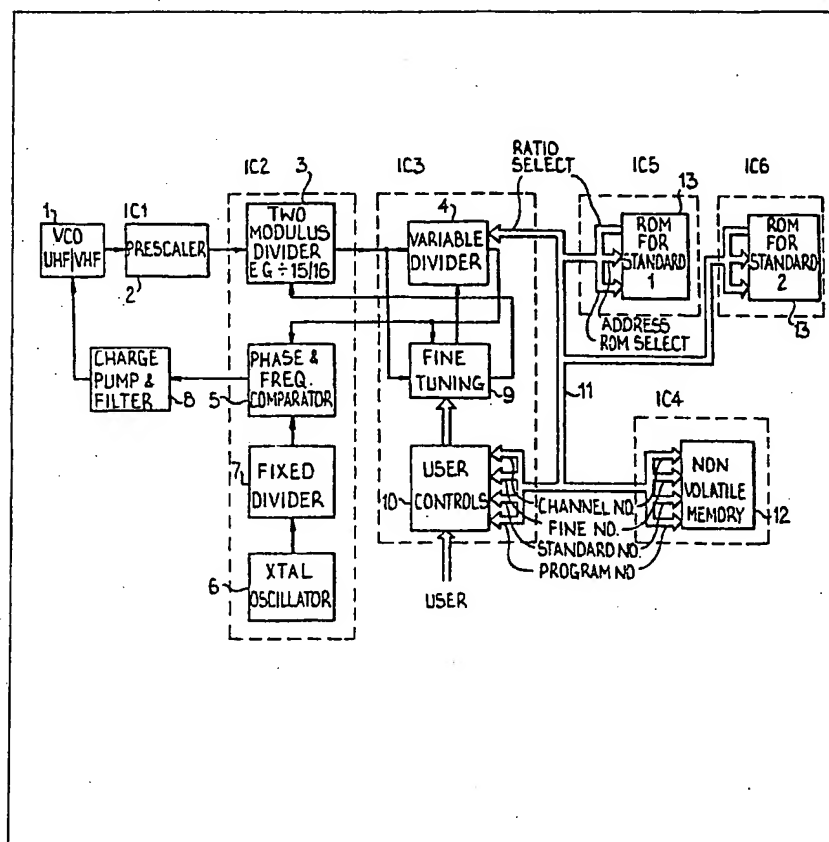
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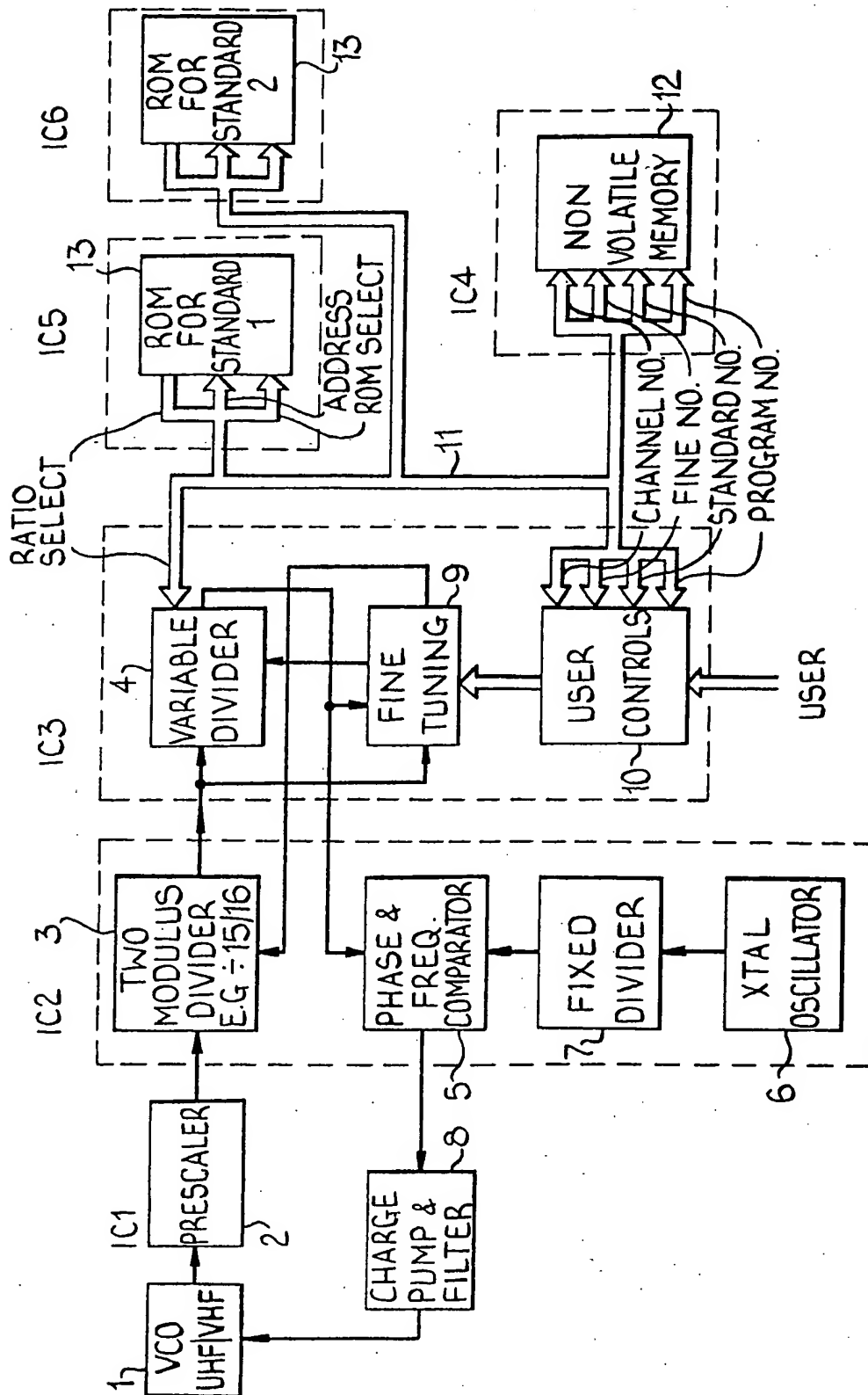
## (54) Frequency synthesis control system

(57) A frequency synthesis control system is provided for selecting channels in a television receiver. A channel is selected by setting a variable divider 4 from information contained in a programmable memory in which a number of memories 13 are provided each containing channel setting information for a group of channels each group being different so that a number of television standards may be simultaneously catered for a particular standard being selected by choosing the appropriate

programmable memory. Each standard employs a different group of channels so that channel frequencies and IF tuning frequencies may vary from country to country. A memory 12 stores channel information corresponding to setting of push buttons at 10 for channel number, fine tuning settings for the different channels, TV standard information corresponding to the standard setting at 10 and programme number information. Fine tuning circuit 9 adjusts division ratio of variable divider 4 and selects either divide by 15 or 16 for divider 3 corresponding to the channel selected.



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## SPECIFICATION

**Improvements in or relating to communication equipment**

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This invention relates to communication equipment and is particularly applicable to television receivers.

In our co-pending application 32419/76 there is described an equipment applicable to a television receiver, utilising a digital synthesis technique for tuning the local oscillator of a receiver. The invention in that application provides a frequency synthesis control system which has a variable frequency oscillator and a division arrangement for dividing the output of the oscillator. The division arrangement includes a variable divider in which the division ratio is selected in accordance with a required channel or frequency.

The invention as described in the above application is only applicable where it is required to select a channel from a single group of channels. In the television field this may be the group of channels used in a single television standard. At the present time there are fourteen different television standards in use throughout the world each standard employing a different group of channels so that the channel frequencies and the I.F. tuning frequencies may vary from Country to Country.

This invention seeks to provide a communication equipment which is applicable to more than one group of channels.

According to this invention there is provided a frequency synthesis control system for communication equipment including a variable frequency oscillator the frequency of which is changed to effect channel or frequency tuning of said equipment the control system comprising: divider means operable on the output of the variable frequency oscillator, the divider means including a variable divider the division ratio of which is selectable in accordance with a required channel or frequency, setting means arranged in at least two parts each part for setting the division ratio of the variable divider in accordance with a selected channel or frequency of a respective group of channels or frequencies, and control means operable to select a respective part in dependence upon the required group of channels or frequencies.

The setting means may be a single memory having at least two parts or may comprise at least two discrete memories.

This invention will now be described with reference to the accompanying single figure drawing which shows a control system of the invention incorporated as part of a television receiver.

Referring to the drawing there is shown a frequency control system applied to a television receiver and arranged to provide for control operation with different television standards.

A voltage controlled local oscillator (VCO) 1, operable at either UHF or VHF frequencies provides an output frequency which is divided by a divider means consisting of a fixed prescale divider 2, a two modulus divider 3 having a division ratio of for

example 15 or 16 which may be selected as later described, and a variable divider 4 which has a division ratio which may be set in accordance with a selected channel.

The output of the variable divider 4 is fed to a phase/frequency comparator 5 which compares this output with a reference frequency derived from a stable crystal oscillator 6 via a fixed divider 7.

Output signals provided by the comparator 5 are fed to control the frequency of the VCO 1 via a charge pump and filter 8 which forms a suitable control voltage from the comparator output.

A fine tuning circuit 9 is provided to adjust the division ratio of the variable divider 4 and to select either divide by 15 or 16 in respect of the divider 3, in dependence upon the channel selected by a user.

Fine tuning settings for the fine tuning circuit 9 are fed via a user control 10 which also feeds four items of tuning information namely channel number, fine tune number, standard number and programme number via a highway 11 to a non volatile memory 12.

The memory 12 is operative to store channel information corresponding to settings of the user controls e.g., channel number; fine tuning settings for the different channels; television standard information corresponding to the different standard settings of the user controls, and programme number information.

A number of programmable read only memories, 13 are provided, of which only two are shown, and each memory corresponds to an individual one of a number of different television standards for which tuning control is required. Each memory 13 contains settings of the variable divider 4 for each of the channels of the group which form part of the individual standard to which that memory corresponds.

Each memory 13 communicates with the divider 4, the user control 10 and the non volatile memory 12 via the highway 11, this being time multiplexed if necessary. When a user selects a desired television standard by means of the user control 10, this information is passed via the highway 11 to the memory 12 and one of the memories 13 is selected via the same highway 11.

When the user selects a desired television programme by means of his user controls, which may be direct manual controls or remote controls, the selection is passed over the highway 11 to the memory 12 which identifies the corresponding channel and communicates a channel address to the selected memory 13 via the highway 11. The channel address identifies the required setting for the divider 4 within the selected memory 13.

The memory 12 also communicates the appropriate fine tune setting via the highway 11 and this is passed to the fine tuning control 9 which provides a fine setting for the divider 4 and selects the appropriate ratio for the divider 3.

Channel numbers can be equated with desired programme numbers by indicating this to the memory 12 via the channel select and programme select mechanisms which form part of the user control 10. For example the programme select may

be a push button unit, possibly remote in action and the channel select may be digital thumb wheel switches.

As can be seen from the above the present invention enables a single control system to be provided for any desired number of television standards and fitted to a receiver destined for any Country, the desired standard being selected in use either by a viewer or a service engineer, or a manufacture.

Although only two memories 13 have been illustrated, as many may be provided as there are world standards. Whilst discrete memories have been shown this is not essential and different parts of a single random access memory may be used for the different groups.

Further whilst the invention has been described with reference to a television receiver where different television standards must be catered for, this is not essential. The invention may be employed in any communication equipment where there are different tuning requirements for different groups of channels.

The invention is particularly suitable for implementation in integrated circuit form. In the arrangement illustrated in the drawing, those items forming part of respective integrated circuit are shown within blocks 1c1, 1c2 etc. As can be seen the individual memories 13 provided for the different standards can be in the form of discrete integrated circuits, 1c5, 1c6 etc. and to provide for additional standards it is merely necessary to add the required number of integrated circuits.

#### CLAIMS

1. A frequency synthesis control system for communications equipment including a variable frequency oscillator the frequency of which is changed to effect channel or frequency tuning of said equipment the control system comprising divider means operable on the output of the variable frequency oscillator the divider means including a variable divider the division ratio of which is selectable in accordance with a required channel or frequency, setting means arranged in at least two parts each part for setting the division ratio of the variable divider in accordance with a selected channel or frequency of a respective group of channels or frequencies, and control means operable to select a respective part in dependence upon the required group of channels or frequencies.

2. A frequency synthesis control system as claimed in claim 1 in which the setting means is formed by a single memory having at least two parts.

3. A frequency synthesis control system as claimed in claim 1 in which the setting means is formed by at least two discrete memories.

4. A frequency synthesis control system as claimed in claim 3 in which the discrete memories are read only memories.

5. A frequency synthesis control system substantially as herein described with reference to and as illustrated in the accompanying drawing.

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